

CLAIMS:

1. A grinding ball having a hardened section of tempered martensite wherein said ball has been stress relieved to stabilize said ball against break up and/or spalling by developing an outer stress relieved martensitic shell.
2. A grinding ball of claim 1 wherein said martensitic shell has a hardness of 55 to 65 Rockwell C.
3. A grinding ball of claim 2, wherein said martensitic shell has a hardness of 60 to 65 Rockwell C.
4. A grinding ball of claim 1 wherein said ball has a chemistry of:
- | | |
|------------|-----------------------------------|
| carbon | .70 - 1.30% by weight |
| manganese | .60 - 1.00% by weight |
| silicon | .10 - .40% by weight |
| chromium | residual levels - 1.00% by weight |
| molybdenum | residual levels - 0.5% by weight. |
5. A grinding ball of claim 1, wherein said ball is less than 8 cm in diameter and said martensitic section extends to ball core.
6. A grinding ball of claim 1 wherein said ball is greater than 8 cm in diameter and said stress relieved martensitic section reduces circumferential internal compressive stresses in the outer martensitic section and thereby stabilizes said ball against break up as caused by balancing tensile stresses in the pearlitic core exceeding the tensile strength of the core.